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ABSTRACT

With the proliferation of suicide prevention centers in the United States, the task of rapidly and effectively assessing an individual caller's suicide potential has become an important research problem. However, the social science researcher is often confronted with an ethical problem when the results of his predictive equations can be used to label people. It may be necessary to switch from predicting negative features to those which are positive and insulating. Predictaion instruments are best made for defined classes of persons. Longer lengths for the assessment instrument are not an advantage since research shows no relationship between predictive accuracy and amount of information available. Predictive instruments are relative to the persons involved, the criterion behavior to be predicted, and the social system in which the person and behavior are found. While predictive instruments can distinguish between different kinds of risks, estimate future risks, and form a baseline against which the outcomes of treatments can be judged, the challenge of predicting suicidal behavior remains. (JAC)

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Predicting Suicide: Issues, Methods and Constraints

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With the proliferation of suicide prevention centers in the United States (several hundred to date), the task of rapidly and effectively assessing an individual caller's suicide potential has come to the fore as the sine qua non research problem. Much of the pioneering work in the area of evaluation and assessment of suicide potential has stemmed from the Los Angeles Suicide Prevention Center.

Prediction: A Definition

The word prediction may be generally understood as the estimation of one phenomenon from a knowledge of others to which it is related empirically. In this context, a prediction instrument is one which uses certain information (e.g., item scores) applying to a person at one point in time in order to estimate the probability of his becoming or remaining suicidal at some later point in time.

Prediction as Scientific Criterion

Over the last few years, I have reflected upon various aspects of the problems of predicting behaviors - particularly behaviors leading to suicide (Lettieri, 1974a), and drug misuse (Lettieri, 1975). These reflections stem from two major sources: (1) the actual development and implementation of a series of scales to predict future suicide (Lettieri, 1974b); and (2) a growing conceptual linkage between suicide, drug abuse, and the broader framework of life-threatening/enhancing behaviors (Lettieri and Nehemkis, 1974; Lettieri and Backenheimer, 1974).

The basic tenet herein is that the ultimate criterion for a phenomenon under scientific investigation is its predictability and hence its network of predictive equations. Such a criterion has been the firm ground on which much of modern chemistry and physics have rested. For instance, the atomic theory in chemistry gained recognition not because we have been able to see atoms or atomic structure, but because certain equations and principles have been delineated which allow the researcher to predict phenomena. It is on the basis of high positive correlations between the prediction and the observation that theories become verified.

The Ethics of Prediction

The social science researcher interested in prediction is often confronted with an ethical problem whenever the results of his predictive equations can be used (misused) to "label" persons. The work in crime and delinquency prediction has been fraught with these dilemmas, as have been some diagnostic aspects of mental health evaluations. Certainly, the ethical costs of such labels must be considered and weighed with regard to their potential benefits.

I propose a compromise for some of the problems of prediction with regard to the fields of suicidology and drug abuse. With particular reference to drug abuse, there are clearly social and legal detriments to being labelled a "drug addict." The costs may not outweigh the benefits. On the other hand, in suicidology, the benefits derived from being able to predict future suicidal death through the utilizaiton of predictive labels, may outwiegh the disadvantages that are associated with the labeling process.

For certain specialized, emotionally charged circumstances, I would propose that, rather than identify suicide predictor variables, one could delineate those variables which mitigate against suicide - in other words, suicide-resistor-variables. Such an approach is both predictive and constructive, for it tells other treatment and research personnel what characteristics and traits should be reinforced to help immunize an individual from the problems of suicide. Quite simply, I recommend that whenever an area of inquiry raises such ethical problems, one must switch focus from prediction of the negative features to those features which are positive and insulating.

Evaluation and Prediction

An issue of confusion relates to the distinction between evaluation and prediction. These are not equivalent terms. When one evaluates a case, one is making a judgment based on how similar an individual is to other known individuals. In a sense, the evaluation is a function of how representative this person is with respect to a class of persons with known behaviors and characteristics. Evaluation is thus based on given information or inputs. Prediction, on the other hand, is based on the outcomes: i.e., statistical base rates and expectancies. For example, one may evaluate a person as being similar to other high-risk suicidal persons one has previously treated and hence class him as high risk. This judgment is different from, and in some special instances may be completely unrelated to, the second type of judgment, namely the likelihood that the person will actually commit suicide. Clearly, not all persons classed as high risk do, in fact, commit suicide. In short, the evaluation or assessment of high risk may or may not be related to the prediction that suicidal death will occur.

Time-Bound and Time-Limited Prediction

In a very real sense, the concept of prediction must be understood in terms of "time-bound" and "time-limited" prediction. Measures taken at time 1 are used to predict some phenomenon at time 2, where time 1 occurs temporally prior to time 2. The researcher must be cognizant that prediction instruments are both time-bound and time-limited. Such tools are time-bound in the sense that the time at which the initial measurements are made (viz., time 1) reflect and capture a particular psycho-social state of the individual, and great care must be given to the choice of time at which such measures are initially taken. For example, if one were interested in predicting the driving patterns of an individual, then it would be appropriate to take the initial measures when the individual was driving as opposed to when he was sleeping. Similarly if one wished to predict some future suicidal behavior, it would seem wise to have base line measures taken when the person was engaging in some suicidal behavior. But prediction instruments are also time-limited, or ideally should be, to maximize their efficiency. The time-limit refers to that interval between the initial, or base-line, time 1 measures and the predicted outcome at time 2.

The time interval between times 1 and 2 can conceivably range from moments to eons; further it is recognized that the smaller the interval, the potentially greater will be the power and accuracy of the predictive tool. The essential issue rests with the degree of control over the amount of unforeseen, uncontrollable variation which may affect and interact and hence mollify the value of the base line measures. Certainly an instrument which predicts that some

behavior will or will not occur within the next three minutes can conceivably achieve greater efficiency and power than a tool which attempts to predict the occurrence of some phenomenon within the distant future. The concept of ceteris parabus is applicable here. In most instances, practical requirements force us into a choice of time limits. In one study I performed (Lettieri, 1974b), the predictive instrument was limited to make predictions for a period up to two years from the initial base line measures. This decision was not arbitrary; rather it was discovered that if a person would indeed commit suicide, he would do so within a period up to two years from his last contact with a suicide prevention center (Wilkens, 1970).

Selective Prediction and Sample Homogeneity

Two methodologies, association analysis technique (Williams and Lambert, 1959) and predictive attribute analysis (Macnaughton-Smith, 1963), stress that relationships between predictive cues or items and the criterion variable may vary greatly in a sample that is relatively heterogeneous; moreover it is recognized that the power and efficiency of a prediction instrument increases with decreases in the heterogeneity of the groups of persons about which predictions are to be made. An instrument is maximally efficient if it correctly predicts or classifies all persons into the appropriate categories under study. The state of the art of psychological prediction, however, is far from achieving the maximally efficient instrument. It would seem that there are at least two important ways the researcher may adjust his predictive device to increase its homogeneity or decrease its heterogeneity. The first is to carefully take measures of individuals at time 1 when they are all in some similar psychological state - in this case, at a time when they are calling a suicide prevention center because of current, personal suicidal feelings, thoughts, and threats. In short, they are all in a suicidal crisis situation. A second way is to statistically control various kinds of subgroupings of suicidal callers on certain basic and relevant parameters such as age or sex, or degree to which the suicidal plan is elaborated, or history of repeated suicidal attempts.

Thus, of the pool of callers, various subgroupings could be distilled such that within each of the subgroups homogeneity would be increased - in essence a type of gross within-group matching procedure. The work of Neuringer & Lettieri (1982) is an example of this.

The Criterion Prediction Variable

As has been noted, prediction instruments are best made for defined classes of persons, for example: suicide threateners vs. attempters vs. completers, males vs. females, young vs. old, poor vs. rich, white vs. black, single vs. married. The more delimited, and hence homogeneous, the group under study, the more likely the increased efficiency of the instrument. This notion applies, in a broader sense, to the criterion variable as well. An instrument which aims at predicting future suicidal behavior of general sorts will most probably be less efficient and accurate than one which has a more focused, highly specific criterion of suicidal behavior. The ultimate problem for suicidologists is the prevention of suicidal death. The instrument I developed (Lettieri, 1974b) focused specifically on the prediction of future suicidal death as opposed to the more global concept of future suicidality which may include such behaviors as threats, attempts, gestures, and ideations.

The Psychology of Prediction

One of the newer and more creative (if not self-conscious) aspects of inquiry on prediction has been the work of Kahneman and Tversky (1973) on the psychology of prediction. Their findings seem particularly germane to the prediction of infrequent events or phenomena with low base rates such as suicidal death and heroin addiction. These authors clearly demonstrate that as long as there is some information or descriptive case material available clinical judges will ignore the base rate information and predict an outcome on the basis of how representative the case description is to the stereotype of that client group and the behaviors to be predicted. It is only when no specific information whatsoever is given that the clinician will predict an outcome on the basis of base rate of prior probability information. If specific, but worthless information is given, the clinician will proceed as though the information were reliable and usable and here too ignore base rate information.

Length and Scope of Predictive Instruments

It has often been assumed that clinical judgment will become more accurate when more relevant information is available. The research findings, however, do not support this, and in fact most studies of clinical prediction have not shown a positive relationship between a judge's predictive accuracy and the amount of information available to him (Goldberg, 1968). There is thus little support to believe that vast amounts of information or very long predictive instruments, will, in the long run, be any more efficient predictors than concise and germane predictive tools. In fact, if one finds that two measurements vary closely together, one of them is unnecessary; it can contribute nothing to the information provided by the other. What is worse, if one puts measurements which are highly correlated (redundant) together into a predictive scheme, one really uses one measurement twice, thus potentially giving it an importance which is twice what it should be. It is precisely for these reasons that a stepwise discriminant function analysis (Dixon, 1968) is among the best predictive methodologies currently available (Ward, 1968). The selection and combination of predictive items may be done by a variety of methods ranging from the simple adding up of points for "good" and "bad" factors to more complex methods (e.g., stepwise discriminant function analysis) which take account of not only the association of each factor with the criterion but also the relationships between the factors themselves. The essential feature of D.F.A. (discriminant function analysis) is that it affords a means of selecting from a large number of items those which have the most predictive value and of combining these with the aim of making the combination a more powerful predictor than any of the individual items alone. The stepwise discriminant function, an elegant version of multiple regression analysis, systematically and in stepwise fashion seeks only the most pertinent, discriminating items for inclusion in the final scale and discards the redundant items.

Systems Analysis and Prediction

In the mid-1930's, a physicist named Heisenberg revolutionized thinking with what has come to be called the Heisenberg Principle - namely, that the very act of measuring some phenomenon may change the phenomenon under study. This implies

that the situational context in which a measurement is taken may have to be measured as carefully as the phenomenon under study. Various social scientists have borrowed from this principle as witnessed by the emergence of field theory in social psychology. Recently, prediction researchers have come to employ the term "bidirectional causality" to capture the insight of Heisenberg. From a systems theory point of view, the prediction of behavior specified that any one element or person in a system is not acted upon unidirectionally by another element, but rather that causal effects are bidirectional; in other words, the elements do not follow the classical British empiricist notion of straight line or historical cause and effect relations. The systems view argues that the elements interact reciprocally and influence each other so that cause and effect occur simultaneously or in a circular or bidirectional form.

Often suicidologists in North America have looked askance at studies that examined climatic influences on suicidal rates. My intent is neither to advocate nor disavow climatic research; rather I wish to highlight that one must be cognizant of the "systems view" of causality and its implications for predictive studies. I would go further and cautiously advocate the somewhat extreme atheoretical notion that any factor that may have predictive value is justifiable grist for the researcher's mill. Clearly, one must recognize the vast divergence between a person's perceptions of the environmental system and the environmental system as it may actually exist. One must measure not only the person's perception that, for example, today's weather is gloomy (or bright), but also measure the external reality of the weather.

The Relativity of Prediction

Predictive instruments are relative to the persons or types of persons involved, the criterion behavior to be predicted, and the system or social setting in which the person and the behavior are embedded. All three elements, the person, the behavior, and the system, are not static; quite the contrary, they endure continual change. Regrettably, one often presumes the elements to be static in order to make prediction more feasible. Given that there is continual change and flux, it becomes very difficult to cross-validate a predictive instrument. Specifically, the results from an original predictive scale may subsequently fail in cross-validation because of an altered system state, although the persons and the behaviors appear relatively stable, comparable at the two points in time.

System alterations can include changes in the management or volunteer personnel of crisis centers, changes in treatment policy, pay scale adjustments, new locations or offices, etc. That such changes in systems occur and have impact has been recognized by the growing use of time-sampling cross-validation techniques to assess the stability of person prediction. Even with time sampling validations, such procedures will fail unless careful measurements are made of the system, as well as of the persons. If one can measure persons and systems simultaneously at one point in time, and again at a later point in time, one can then account for changes in either the person or the system which influence behavior, compensate and correct the equations, and stabilize predictive efficiency. Measuring persons alone will inevitably lead to unstable predictions over time.

Replication in Predictive Studies

In discussing replication of predictive studies, one must note that there are at least eight domains in which predictive studies can differ, both in the findings generated and in the meaning of these findings. These areas are: (1) the sample (or more specifically, the homogeneity across the sample groups); (2) the criterion measure (this may be of suicidal death or some therapeutic effect, or other behavior to be predicted); (3) the treatment to which subjects have been exposed between the time the measures are taken, and the predicted behavior; (4) the context in which the treatment is conducted; (5) the actual predictors or variables; (6) the time limits or time ranges, i.e., the time range within which the behaviors are predicted to occur; (7) the time bounds, i.e., the specific psychosocial state of the individual when the measures were taken. Were they taken before suicidal ideation, during or immediately after a suicidal attempt, while euphoric or depressed, etc. and (8) the analysis of the data, i.e., the rigor and robustness of the actual statistical procedures employed to derive the predictive equations.

It is often an error to assume that two groups are comparable if they have the same diagnostic classification. As Wittenborn (1973) points out, "The description of samples in terms of their diagnostic composition often fails to provide sufficient characterization and cannot be used to assure the comparability of samples, even when the two samples bear identical diagnostic designations." He concludes that, "More objective and perhaps more reliable than diagnosis are descriptions of samples in terms of specific symptoms or scores on relevant tests and self-destructive inventories." As examples of such pivotal descriptions, one might cite such items as (1) duration of illness; (2) susceptibility to recurrence; (3) resistance to prior treatment; (4) age, physical health; (5) way of life.

The problem which confronts the research clinician who wishes to replicate a predictive study is how to match his sample with a prior study on such descriptions. These are problems that justly come under the heading of external replication problems. A related issue in replication deals with internal replication problems. Internal replications are easier to handle statistically by using variants of the split-half techniques; that is, collecting data on all the subjects and developing a predictive instrument on half the subjects while replicating and validating the instrument by testing it on the other half of the homogeneous study population.

Uses of Predictive Instruments

A prediction instrument can distinguish between different kinds of risks (e.g., suicidal attempt vs. suicidal death), and it can separate low risks from the high risks. Such a tool may take several forms: a table showing risk groups or a score or equation which gives individual probabilities of risk.

A prediction tool may also be used to estimate the risks of various kinds of suicidal phenomena which are genuinely in the future; for example one may try to identify children with a high probability of becoming suicidal when older so

as to give them preventive treatment now. But such tools can also be used for persons whose suicide potential is already known, in order to estimate the expected risk on the basis of information applicable at an earlier stage, e.g., when to release a recurrently hospitalized suicide attempter for suicide attempts. This latter type of prediction may well be used in research on the effectiveness of treatment. If persons given various treatments (whose outcomes may already be known) are classified according to the risks that would have been expected before the onset of treatment, a baseline is formed against which the outcomes of the treatments can be judged. The development of such a tool, properly called a base expectancy instrument, is in no way as facile as it may appear. The challenge of predicting suicidal behavior is still with us.

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